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ABSTRACT

This report summarizes information regarding populations, methods, evaluation and instructional materials, analyses, and results from three doctoral dissertations that used the Word Attack component of the Wisconsin Design for Reading Skill Development as an instructional and assessment instrument. The first study investigated the assumption that mastery of essential word attack subskills results in functional word attack ability. The second study investigated the degree to which first-grade subjects retained reading ability over summer vacation. Reading ability was measured by both norm-referenced and criterion-referenced tests. The third study investigated the effects on selected teachers of three motivational treatments: (1) pupil reading achievement monitored without feedback to teachers, (2) social incentives given to teachers, and (3) monetary incentives given to teachers. Measures of effect were gain scores on the Wisconsin Tests of Reading Skill Development: Word Attack and staff teachers' perceptions of selected interpersonal variables. (Author/RB)

Technical Report No. 333

THE WORD ATTACK COMPONENT OF THE WISCONSIN DESIGN FOR READING SKILL DEVELOPMENT: THREE EMPIRICAL STUDIES ON SKILL MASTERY, SKILL RETENTION, AND THE EFFECTS OF INCENTIVE TREATMENTS FOR TEACHERS

Edited by

Robert Chester

Report from the Project on
Conditions of School Learning and Instructional Strategies

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WISCONSIN RESEARCH AND DEVELOPMENT CENTER FOR COGNITIVE LEARNING

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- conducting research to discover more about how children learn
- developing improved instructional strategies, processes and materials for school administrators, teachers, and children, and
- offering assistance to educators and citizens which will help transfer the outcomes of research and development into practice

PROGRAM

The activities of the Wisconsin R&D Center are organized around one unifying theme, Individually Guided Education.

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ABSTRACT

This report summarizes information regarding populations, methods, evaluation and instructional materials, analyses, and results from three doctoral dissertations that used the Word Attack component of the Wisconsin Design for Reading Skill Development as an instructional and assessment instrument. Study 1 investigated the assumption that mastery of essential word attack subskills results in functional word attack ability. In addition, the study examined differences in ability to decode phonically and structurally irregular words between students who had received instruction in the Word Attack component of the Wisconsin Design and students who had not received such instruction. Study 2 investigated the degree to which first grade subjects retained reading ability over summer vacation. Reading ability was measured by both norm-referenced and criterion-referenced tests. Study 3 investigated the effects on selected teachers of three motivational treatments: (1) pupil reading achievement monitored without feedback to teachers, (2) social incentives given to teachers, and (3) monetary incentives given to teachers. Measures of effect were gain scores on the Wisconsin Tests of Reading Skill Development: Word Attack and staff teachers' perceptions of selected interpersonal variables.

INTRODUCTION

The purpose of this report is to summarize information from three doctoral dissertations that used the Word Attack component of the Wisconsin Design for Reading Skill Development as an instructional and assessment instrument. The information relates to populations, methods, evaluation and instructional materials, analyses, and results. Each of the three dissertations is treated separately, in the following format: (1) purpose of the study and hypotheses tested; (2) method used in investigating the problem, including descriptions of subjects, materials, and procedures; (3) results and conclusions. Since the three dissertations are very different, having in common only that they relate in some way to the Word Attack component of the Wisconsin Design, no attempt has been made to synthesize their results and implications. Furthermore, although this report includes a considerable amount of specific information from the studies, it is in no way comprehensive. Persons requiring additional information should consult the original documents.

Because the Word Attack component of the Wisconsin Design for Reading Skill Development plays an important role in each of the three studies, this introduction includes a brief description of that program. More complete information can be found in the program's Rationale and Guidelines.[1]

The Wisconsin Design for Reading Skill Development is a criterion-referenced instruction and assessment program focusing on reading skill development from kindergarten through Grade 6. The Word Attack component of this program provides an organizational approach to individually guided instruction in word attack skills for elementary school children. It represents a systematic attempt to (1) state explicitly an array of word attack skills necessary for competency in word attack, (2) assess the individual pupil's skill development status by means of criterion-referenced tests keyed to explicitly stated behaviors related to word attack skills, (3) provide a comprehensive management system to guide planning of and grouping in word attack skill development instruction, and (4) monitor each pupil's progress in the development of specific word attack skills.

The program is organized around the following framework:

1. Identification of essential word attack skills. The Word Attack component lists 45 specific word attack skills considered essential to reading skill development on the basis of consensual, historical, and empirical evidence.

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[1] The Rationale and guidelines for the Wisconsin Design for Reading Skill Development is published by National Computer Systems, 4401 West 76th St., Minneapolis, Minnesota 55435.

2. Statement of Word Attack objectives. For each of the 45 skills, the Word Attack component provides specific objectives which are stated behaviorally. Each objective describes the behavior that indicates that the desired outcome has been achieved and identifies the conditions under which such behavior is expected to occur. The Word Attack objectives thus define, in terms of overt behavior, the performance that will be accepted as evidence of specific word attack skill mastery.

3. Assessment of Word Attack skill attainment. The Word Attack component provides criterion-referenced tests keyed to specific word attack objectives. The Wisconsin Tests of Reading Skill Development: Word Attack (1972) are based on the behavioral objectives related to the reading skills essential for mastery of word attack. These group-administered, machine-scorable tests are available to assess 38 of the 45 skills. They enable the teacher to assess each pupil's proficiency in specific skills and to monitor his progress after instruction. Such paper-and-pencil tests, when combined with informal teacher observation of relevant student behavior, can be used to assess the individual pupil's skill development status.

4. Identification of teaching/learning activities. To assist the teacher in providing effective learning activities, the Wisconsin Design includes the Teacher's Planning Guide: Word Attack, which gives suggestions for implementing the Word Attack component of the program. The program also includes the Teacher's Resource File: Word Attack, containing a helpful list of printed matter which could be used to teach word attack skills. The resource file both aids the teacher in selecting published materials best suited for specific skills and provides the teacher with an example of how to compile his or her own resource files of teaching/learning materials.

5. Evaluation. The Wisconsin Tests of Reading Skill Development: Word Attack represent one type of ongoing evaluation; the ultimate evaluation, however, must be considered in terms of the terminal objective for the Word Attack component. The terminal objective states that upon attainment of all skills outlined in the Word Attack component, the student will be able to attack words that are phonically and structurally regular and will recognize on sight all words on the Dolch list.

STUDY 1

EVALUATION OF AN OBJECTIVE-BASED CURRICULUM IN WORD ATTACK

Ruth J. Kurth

PURPOSE

The main purpose of the first study[2] was to investigate the assumption that mastery of essential word attack subskills results in functional word attack ability. The study sought empirical support for the skill-centered approach to word attack prescribed in the Wisconsin Design for Reading Skill Development. The terminal objective of the Word Attack component of the program is that upon completion of the instructional program, the student will be able to attack words that are phonically and structurally regular and will recognize on sight all words on the Dolch list.

The second purpose of the study was to investigate differences in ability to decode phonically and structurally irregular words between students who had received instruction in the Word Attack component of the Wisconsin Design and students who had not received such instruction. The study sought to answer the following questions, posed as hypotheses.

1. At least 80 percent of a sample of synthetic words containing phonic and/or structural elements taught in the Word Attack element of the Wisconsin Design can be decoded by at least 90 percent of the experimental subjects who have completed the Word Attack element of the Wisconsin Design.

2. At least 80 percent of a sample of phonically and/or structurally regular words of Frequency Stratum 1 can be decoded by at least 90 percent of the experimental subjects who have completed the Word Attack element of the Wisconsin Design.

3. At least 80 percent of a sample of phonically and/or structurally regular words of Frequency Stratum 2 can be decoded by at least 90 percent of the experimental subjects who have completed the Word Attack element of the Wisconsin Design.

4. At least 80 percent of a sample of phonically and/or structurally regular words of Frequency Stratum 3 can be decoded by at least 90 percent of the experimental subjects who have completed the Word Attack element of the Wisconsin Design.

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[2] Kurth, R. J. Evaluation of an objective-based curriculum in word attack. Technical Report No. 289. Madison: Wisconsin Research and Development Center for Cognitive Learning, 1975.

5. At least 99 percent of the sample of words from the Dolch list can be recognized on sight by at least 90 percent of the experimental subjects who have completed the Word Attack element of the Wisconsin Design.

6. At least 80 percent of all of the phonically and/or structurally regular words in the sample can be decoded by at least 90 percent of the experimental subjects who have completed the Word Attack element of the Wisconsin Design.

7. The percentage of phonically and/or structurally irregular words that can be decoded by 90 percent of the experimental subjects who have completed the Word Attack element of the Wisconsin Design will be lower than the percentage of phonically and/or structurally regular words that can be decoded by the experimental subjects.

8. The mean scores of the experimental subjects who have completed the Word Attack element of the Wisconsin Design on the test lists of phonically and/or structurally irregular words will be higher than the mean scores of the control subjects on the test lists of phonically and/or structurally irregular words.

METHOD

Subjects

Subjects for the experimental group consisted of 140 students selected from six elementary schools in Duluth, Minnesota. The subjects ranged in age from 10.0 to 12.0 years, and all had completed the entire Word Attack element of the Wisconsin Design.

Subjects for the control group consisted of 36 students randomly selected from six fifth grades and six sixth grades in three elementary schools in Evansville, Indiana. The age range of the control group was the same as that of the experimental group. None of the students in the control group had received instruction in the Word Attack element of the Wisconsin Design.

Materials

Synthetic words. Synthetic words were developed to test the following seven skills: recognizing long vowel sounds, short vowel sounds, consonant blends, consonant digraphs, vowel diphthongs, vowel plus *r*, and base word endings. Four items were constructed to test each of the skills. The items were designed to resemble real English words both in sound and appearance, and the spelling patterns used were those of the English language. The words had been previously pilot tested. For test administration purposes, the words were divided into two word lists. Following are the skills, the synthetic word lists, and the skill sounds represented by the lists.

Synthetic Word Lists and Skill Sounds

Skills	List 1	List 2
Long Vowel Sounds	Long *e*	Long *o*
	spleed	plode
	drete	toke
	tefe	pote
	beel	boap
Short Vowel Sounds	Short *a*	Short *i*
	strat	splim
	zat	blit
	clab	mish
	jad	dit
Consonant Blends	*pl*	*br*
	plome	brame
	plute	broy
	plig	brish
	plang	brode
Consonant Digraphs	*sh*	*ch*
	grash	chim
	shate	chark
	thrish	mouch
	shoker	nurch
Vowel Diphthongs	*oi*	*ew*
	foiter	prew
	toip	thew
	moil	sprewl
	coise	lewck
Vowel plus *r*	*or*	*er*
	plor	lerse
	korm	verl
	lorp	blerk
	jork	jer
Base Words and Endings	*-ing*	*-ed*
	yalting	garted
	flanging	caded
	gretting	druted
	murling	spletted

Real words. The real words tested in the study were selected from the rank-order list of 50,406 words found in Computational Analysis of Present Day American English (Kucera & Francis, 1967). A stratified random sampling procedure was used to select the test words. The first

stratum of the sample, consisting of 279 words, was drawn from those words having a frequency of from 69,971 to 106, i.e., the first 1,004 words on the Kucera-Francis list. The second stratum of the sample, consisting of 350 words, was taken from those words having a frequency of from 105 to 19, i.e., the words from 1,005 to 5,182 on the Kucera-Francis list. The third stratum of the sample, consisting of 384 words, was drawn from those words having a frequency of from 18 to 1, i.e., the words from 5,183 to 48,397 on the Kucera-Francis list. Of the total sample of 1,013 words, 706 were classified as regular and 307 were classified as irregular.

In developing the test lists, the words classified as regular were separated from the rest of the sample words. The Dolch words found in the sample of regular words were then removed and placed in a separate category, because the words on the Dolch list are taught as sight words in the Wisconsin Design.

The regular words (excluding the words from the Dolch list) were placed in the sampling sequence order. These words were arranged in eight lists, with the first word in the sampling sequence order becoming the first word on the first list, the second word in the sampling sequence order becoming the first word on the second list, and so on, until lists 1 through 4 in each frequency stratum contained six regular words, lists 5 and 6 in each frequency stratum contained eight regular words, and lists 7 and 8 in each frequency stratum contained ten regular words. These lists are shown below.

Regular Word Lists

Stratum I

List 1	List 2	List 3	List 4
forms	applied	level	coming
near	however	training	whole
trial	least	chance	inside
number	able	short	become
personal	running	part	economic
army	room	everything	university

List 5	List 6	List 7	List 8
known	knew	society	bad
numbers	income	greater	wide
wouldn't	court	alone	common
doubt	continue	town	sales
saying	held	property	board
basic	learned	student	market
concerned	life	couldn't	feed
voice	pool	members	doing
		seems	mass
		remember	short

Stratum II

List 1	List 2	List 3	List 4
butter	horses	tossed	lies
bringing	site	exposed	stick
wiped	cap	helping	studying
spite	hell	deeply	pike
apartment	pack	steadily	liberals
rendered	caused	sacred	buying

List 5	List 6	List 7	List 8
reverend	thin	bodily	bodies
spencer	contest	concentrated	performances
describe	drugs	harm	endless
alike	demonstrated	optimal	grand
pace	calling	sixties	reporters
reasonably	November	foams	contrast
finished	snakes	insisted	cooling
test	backed	weather	split
		avenue	loss
		source	maintained

Stratum III

List 1	List 2	List 3	List 4
banking	marsh	dregs	unwilling
sterling	fearing	helplessness	sticky
impinge	showerhead	imitate	ninety-six
epithet	pumped	mistrial	shod
hearsay	lords	paid	fatty
gazes	cutthroat	thousand	cruise

List 5	List 6	List 7	List 8
extrovert	citrus	pinging	stabbed
caseworkers	letterman	disappointing	upswing
trenchant	loosening	metalworking	retrench
well-understood	picket	non-political	homes
desegregate	mobilize	unleash	multi-figure
drip	incompatibility	nearby	treadmill
villa	harvested	defiant	marshes
Leona	cattle	jazz	passerby
		caving	bankruptcy
		incorruptible	shank

The sample words found on the Dolch list were placed in their sampling sequence order. These words were arranged in eight lists, with the first word in the sampling sequence order becoming the first word on the first list, the second word in the sampling sequence order becoming the first word on the second list, and so on, until lists 1 through 4 contained six Dolch words, lists 5 and 6 contained seven Dolch words, and lists 7 and 8 contained eight Dolch words. These lists are shown below.

Dolch Word Lists

List 1	List 2	List 3	List 4
saw	get	found	why
may	if	there	by
some	gave	now	your
you	an	big	well
away	small	of	first
him	she	want	always

List 5	List 6	List 7	List 8
going	bring	them	soon
here	ten	those	because
white	do	has	call
good	hold	think	yes
wish	does	this	or
every	out	tell	keep
before	only	can	own
		four	make

The words from the sample that were not classified as regular words were also included in the test list to determine whether competence in the Word Attack skills of the Wisconsin Design would aid students in attacking phonically and structurally irregular words that they might encounter in their reading. The lists of irregular words were compiled according to the same procedure used for compiling the regular word lists. Lists 1 through 4 in each frequency stratum contained six irregular words, lists 5 and 6 in each frequency stratum contained seven irregular words, and lists 7 and 8 in each frequency stratum contained eight irregular words. These lists are shown below.

Irregular Word Lists

Stratum I

List 1	List 2	List 3	List 4
imagination	beautiful	conditions	view
areas	followed	usually	volume
efforts	country	process	throughout
population	effort	industrial	physical
information	private	behind	production
education	picture	mother	nations

List 5	List 6	List 7	List 8
piece	island	hair	eyes
average	most	business	England
lower	religion	none	George
eye	various	gone	similar
hour	soviet	record	analysis
mind	administration	husband	often
determine	women	design	enough
		question	section

Stratum II

List 1	List 2	List 3	List 4
opinions	alternative	guilty	allies
legislation	estimate	oxidation	objective
typical	marriages	naked	sufficiently
numerous	guy	exploration	traditions
London	delicate	session	honest
automobiles	vary	motive	editorial

List 5	List 6	List 7	List 8
initiative	explanation	politicians	relatively
rare	issues	Missouri	reflection
numerical	colonial	award	tour
Ohio	profession	warmth	reality
implications	relationships	corporations	palace
senate	share	criticism	identification
height	quarrel	washed	discrimination
		July	transportation

Stratum III

List 1	List 2	List 3	List 4
route	noncommissioned	initiator	aversion
photograph	sub-group	excursion	aligned
mechanized	premiums	dishonoured	pastor
modulation	nullify	wreckage	gestured
internationalist	lunar	memorize	word
polarities	mobilization	differentiated	Sunday school

List 5	List 6	List 7	List 8
uncertainties	timbre	nationality	featured
folks	muscle	polled	baptism
world	influential	pamphlets	epoch
efficiently	basting	palaces	posterior
sanction	reassure	restrictive	medication
odyssey	liaison	taxation	barbarous
colloquium	choir	incredulous	faction
		financially	parent

The words designated for each list from the above categories were combined to form the eight lists used for testing. These eight lists included four lists of 42 words each, two lists of 52 words each, and two lists of 62 words each. Lists of different lengths were employed to determine if the length of a word list would have any effect on the subjects' performance.

Procedures

One of the two examiners tested each subject in the experimental group individually, first with a synthetic word list and then with a real word list. The synthetic word list was randomly selected from the two synthetic word lists; the real word list was randomly selected from the eight real word lists.

Test words were printed in lower case letters on small flash cards, and only proper nouns were capitalized. Directions were given orally, and two example items preceded the test. Subjects had ten seconds to pronounce each word. Responses were scored as either correct or incorrect. Mispronunciation resulting from placing the accent on the wrong syllable was regarded as an error. The raw score for each subject was the number of words pronounced correctly from each list.

The control subjects were tested individually on lists of irregular words. Testing procedures were the same as for the experimental group.

RESULTS AND CONCLUSIONS

An analysis of the data on the synthetic word lists indicates that the first hypothesis is supported. At least 80 percent of the sample of synthetic words could be decoded by at least 90 percent of the experimental subjects who had successfully completed the Word Attack component of the Wisconsin Design.

An analysis of the data on the regular word lists indicates that the first and second hypotheses are supported. At least 80 percent of a sample of phonically and/or structurally regular words of the first and second frequency strata could be decoded by at least 90 percent of the experimental subjects. However, an analysis of the data on the regular word lists indicates that the fourth hypothesis must be rejected. Fewer than 90 percent of the experimental subjects could decode at least 80 percent of the phonically and/or structurally regular words of the third frequency stratum. The fifth hypothesis is supported by the data on the regular word lists. At least 99 percent of the sample of words from the Dolch list could be recognized on sight by at least 90 percent of the experimental subjects. However, an analysis of the data on the entire regular word list indicates that the sixth hypothesis must be rejected. Fewer than 90 percent of the experimental subjects could decode at least 80 percent of the phonically and/or structurally regular words in the sample. Thus, the terminal objective of the Word Attack component of the Wisconsin Design was not attained.

An analysis of the data on the irregular word lists supports the seventh hypothesis. The experimental subjects decoded a smaller percentage of the sample of phonically and/or structurally irregular words than of the sample of regular words. An analysis of the data on the irregular word lists also indicates that the eighth hypothesis is supported. The mean scores of the experimental subjects on the test lists of phonically and/or structurally irregular words were higher than the mean scores of the control subjects on those lists.

In conclusion, it was found that the experimental subjects who had completed the Word Attack component of the Wisconsin Design attained the suggested 80 percent mastery level on the synthetic word lists, indicating that they had learned the phonic and structural analysis skills tested in the study. A low percentage of error for each group of synthetic words in the individual sublists further confirms that the subjects had attained these skills. A larger percentage of errors in response to the words testing diphthongs and long vowel sounds indicates that students had more difficulty with these phonic elements.

The fact that at least 90 percent of the experimental subjects were able to decode the words of the first and second frequency strata of the regular word sample at an 80 percent mastery level further indicates their ability to decode phonically and/or structurally regular words. Nevertheless, since they did not achieve the specified mastery level when decoding words of the third frequency stratum (or on all the regular words), the terminal objective of the Word Attack component of the Wisconsin Design was not achieved as measured by the study.

STUDY 2

SEX, INTELLIGENCE, AND SCHOOL READING CURRICULUM AS FACTORS INFLUENCING SUMMER RETENTION OF OVERALL READING ABILITY AND SPECIFIC READING SKILLS OF FIRST-GRADE SUBJECTS

Robert T. Rude

PURPOSE

The purpose of the second investigation[3] was to determine the degree to which first-grade subjects retain their reading ability over summer vacation. This study examined two aspects of reading ability: (1) overall reading ability as measured by norm-referenced reading tests, and (2) specific reading skills as measured by criterion-referenced reading tests, i.e., the Wisconsin Tests of Reading Skill Development. In addition, the study sought to determine if there were significant differences in retention between males and females, among students of above-average, average, and below-average mental abilities, and between subjects enrolled in an objective-based reading program and those in traditional reading programs. Following are the hypotheses for the study and other relevant questions for which answers were sought.

Hypotheses:

1. There will be no significant difference between spring and fall Gates-MacGinitie Reading Tests or the Wisconsin Tests of Reading Skill Development.

2. There will be no significant difference in retention ability between males and females.

3. There will be no significant difference in retention ability of subjects having above-average, average, and below-average mental ability.

4. There will be no difference in retention ability of subjects enrolled in the objective-based reading skills program versus subjects enrolled in the basal reading curricula.

[3] Rude, R. T. Sex, intelligence, and school reading curriculum as factors influencing summer retention of overall reading ability and specific reading skills of first-grade subjects. Technical Report No. 263. Madison: Wisconsin Research and Development Center for Cognitive Learning, 1974.

Questions:

1. What is the frequency distribution and range of scores for each of the reading measures?

2. Will there be a change in the percentage of subjects considered to be "masters" of the specific reading skills in the spring compared to those considered "masters" in the fall?

3. Will there be a trend toward decreased skill mastery over the summer?

METHOD

Subjects

Subjects for the study were 545 first-grade children. This group represented all first graders in nine elementary schools of four north-eastern Wisconsin school districts. Approximately one-half of the subjects were enrolled in an objective-based reading program, while the remaining subjects were enrolled in basal reading curricula. Subjects for whom complete data were not available, and subjects with IQ scores that fell within the third or seventh stanines on the California Short-Form Test of Mental Maturity, were not included in the final data analysis. After removing these subjects, the final population was 311.

Measurement Instruments

Overall reading ability was measured by the vocabulary and comprehension subtests of the Gates-MacGinitie Reading Test, Primary A, Forms 1 and 2 (1965). The vocabulary test samples the child's ability to read and understand whole sentences and paragraphs. The Gates-MacGinitie Reading Test is a norm-referenced, standardized instrument. Specific reading skills were measured by the Wisconsin Test of Reading Skill Development: Word Attack, Level B, Forms I and II. These tests are criterion-referenced rather than standardized. They measure sight vocabulary, phonics, and structural analysis skills. The 12 skills at Level B are listed below.

1. Sight Vocabulary
2. Beginning Consonants
3. Ending Consonants
4. Consonant Blends
5. Consonant Digraphs
6. Compound Words
7. Rhyming Elements
8. Short Vowels
9. Contractions
10. Base Words
11. Plurals
12. Possessives

Mental ability scores were derived from the seven subtests of the California Short-Form Test of Mental Maturity, Level O (Sullivan & Clark, 1963). The seven subtests are grouped to form four factors. When the four factors are combined, a Total Intelligence Score is derived.

Curricula

Subjects were divided into two curriculum categories: (1) those receiving objective-based instruction, i.e., the Wisconsin Design for Reading Skill Development, while in first grade, and (2) those receiving basal reading instruction.

Procedure

Prior to testing, the investigator conducted an inservice training program for key personnel in each of the nine elementary schools. School representatives who had attended this initial session then conducted training sessions for local first- and second-grade teachers.

Two weeks prior to school dismissal for summer vacation, all first-grade teachers in the study administered the Wisconsin Tests of Reading Skill Development: Word Attack, Level B, Form I; the Gates-MacGinitie Reading Tests, Primary A, Forms 1 and 2; and the California Short-Form Test of Mental Maturity. To reduce the chance of a testing order effect, the schools were randomly assigned to three categories, and the tests were administered according to a randomly derived testing schedule.

The fall testing program was similar to the spring testing program, with three major differences: (1) all testing was done by the second-grade teachers, (2) the California Short-Form Test of Mental Maturity was not administered again, and (3) Form II of the Wisconsin Tests of Reading Skill Development: Word Attack, Level B, was administered. The fall testing program was conducted during the second full week of school in each of the nine districts. Again, the order for administering the tests was randomly derived.

RESULTS AND CONCLUSIONS

A multiple analysis of variance program and descriptive statistics were used to analyze the data. Subjects in the third and seventh stanines on the California Short-Form Test of Mental Maturity were eliminated from the analysis, enabling the investigator to establish three distinct intelligence groups, separated from one another by one stanine. The dependent variable was the mean spring-fall test scores of all subjects. The independent variables were sex, intelligence, and school curriculum. A 2 x 3 x 2 factorial design using the multivariate analysis of variance technique was used to determine whether or not a relationship existed between the variables.

The first hypothesis--that there would be no significant difference between spring and fall reading scores on the Gates-MacGinitie Reading Test or the Wisconsin Tests of Reading Skill Development--was rejected. There were significant losses of overall reading ability in both vocabulary and comprehension on the Gates-MacGinitie Reading Test. On the

vocabulary test, change between the mean spring and fall scores amounted to a loss of 1.35 raw score points, which was found significant at the .001 level. The loss on the comprehension test was less than 1 raw score point, but it was still statistically significant at the .01 level. Also, there were statistically significant losses on nine of the 12 tests of specific reading skills as determined by the Wisconsin Tests of Reading Skill Development. Although there were no significant losses on three tests assessing structural analysis, there were statistically significant losses on the six tests measuring phonic skills. Again, as with the scores from the Gates MacGinitie Reading Test, the raw score changes were extremely small. Whether statistical significance amounts to educational and psychological significance in such cases is open to interpretation by each reader of the study.

The study failed to reject the second hypothesis, that there would be no significant difference in retention ability between males and females. There were no significant differences between the sexes in retention scores on either norm-referenced or criterion-referenced tests.

The study failed to reject the third hypothesis, that there would be no difference in retention among subjects of above-average, average, and below-average mental abilities. The study did, however, reveal that subjects of average IQ lost significantly more skills in the areas of rhyming elements and consonant digraphs than did the subjects with above- or below-average IQ.

The study also failed to reject the fourth hypothesis, that there would be no significant difference in retention ability of subjects enrolled in the objective-based reading skills program and subjects enrolled in the basal reading curricula.

In conclusion, the study found a statistically significant difference between mean spring and fall test scores on 11 of the 14 measures. Sex of the subjects and type of school curricula were not significantly related to ability to retain reading skills. Intelligence of subjects was found to be related to retention ability on only two of the measures. Finally, about 15 percent of the subjects classified as "masters" of specific reading skills in the spring were reclassified as "non-masters" in the fall.

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STUDY 3

THE EFFECTS OF MONITORING PUPIL PERFORMANCE AND TWO INCENTIVE TREATMENTS FOR TEACHERS ON PUPILS' READING SKILL DEVELOPMENT AND TEACHERS' ATTITUDES

Roger W. Klumb

PURPOSE

The primary purpose of this third investigation[4] was to determine the effects of three motivational treatments given to selected teachers. The three motivational treatments were (1) pupil reading achievement monitored without feedback to teachers, (2) social incentives given to teachers, and (3) monetary incentives given to teachers. Specifically, the study sought to investigate the effects of the three treatments as measured by changes in (1) pupil reading achievement, as indicated by gain in scores on the Wisconsin Tests of Reading Skill Development: Word Attack, and (2) staff teachers' perceptions of selected interpersonal variables.

Listed below are the two hypotheses tested by the study and four relevant questions for which answers were sought.

Hypotheses:

1. Pupils in the control group and pupils in the experimental groups will not differ significantly in reading skill mastery.

2. Teachers in the control group and teachers in the experimental groups will not change their perceptions of selected interpersonal variables.

Questions:

1. Does monitoring of pupil reading skill mastery without feedback to the teacher act as an incentive?

2. Do monitoring of pupil reading skill mastery and providing teachers with informational feedback affect the amount of pupil learning?

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[4] Klumb, R. W. The effects of monitoring pupil performance and two incentive treatments for teachers on pupils' reading skill development and teachers' attitudes. Technical Report No. 268. Madison: Wisconsin Research and Development Center for Cognitive Learning, 1973.

3. Do monitoring of pupil reading skill mastery and providing teachers with monetary incentives affect the amount of pupil learning?

4. Do incentives based upon pupil achievement affect teachers' perceptions of interpersonal variables related to the school learning climate, staff meetings, the building principal, and innovation?

METHOD

Subjects

Subjects consisted of 170 six- to eight-year-old students and 69 teachers from 15 schools in Connecticut, Illinois, Minnesota, and Wisconsin. All the schools followed the Multiunit School--Elementary plan, a component of the Individually Guided Education program developed at the Wisconsin Research and Development Center for Cognitive Learning. Under this plan, the schools were arranged in units of 100-150 children with age spans of two to four years. One principal and an average of 4.6 teachers from each school participated in the study.

Instructional Program and Assessment Instruments

The Word Attack component of the Wisconsin Design for Reading Skill Development was used as the instructional program for word attack skill development by all schools in the study. The Wisconsin Design: Word Attack program provides a list of word attack and structural analysis skills considered essential for decoding words. In addition to the skills list, the program contains behavioral objectives, a mangement system, criterion-referenced tests, and a teacher's resource file covering all skills.

The Wisconsin Tests of Reading Skill Development: Word Attack, Levels B and C, were used as both the pretests and posttests in the study. The skills included in the testing are listed below.

Level B	Level C
Beginning Consonants	Consonant Variants
Ending Consonants	Consonant Blends
Consonant Blends	Long Vowels
Rhyming Elements	Vowels + *r*, *a* + *l*, *a* + *w*
Short Vowels	Diphthongs
Consonant Digraphs	Long and Short *oo*
Compound Words	Middle Vowel
Base Words	Two Vowels Separated
Plurals	Two Vowels Together
Possessives	Final Vowel
	Consonant Digraphs
	Base Words
	Plurals
	Homonyms
	Synonyms, Antonyms
	Multiple Meaning

Questionnaires consisting of several sections of an instrument designed by the Cooperative Project in Educational Development were used to measure teachers' perceptions of four areas of interpersonal variables (Hilfiker, 1969). The interpersonal variables investigated were (1) the teachers' perceptions of colleagues in terms of adaptiveness, openness, and trust; (2) the building principal's role in terms of professional leadership and social support; (3) I & R Unit meetings as they reflected each teacher's feelings of openness or powerlessness and the group's problem-solving adequacy; and (4) innovativeness, in relation to sources of and reasons for innovation.

Procedures

Before the pretesting, four types of treatment groups were established. They are listed and described below.

Control Group. Schools in this group implemented the Wisconsin Design: Word Attack program in accordance with decisions made in local schools. They received no directions or feedback from the investigator. After the teachers in this group had answered the teacher questionnaire and administered the Wisconsin Tests of Reading Skill Development: Word Attack, they had no further contact with the investigator until the posttest.

Monitoring Pupil Achievement Group (Experimental Group 1). In this group, staff reading teachers administered the Wisconsin Tests of Reading Skill Development: Word Attack to the pupils, and pupil achievement was monitored by the investigator. Single tests from the Wisconsin Tests of Reading Skill Development: Word Attack, designed to measure specific skill mastery, were given at the end of each instructional period. The tests were then submitted to the principal, who forwarded a summary of pupil reading skill mastery to the investigator. The teachers received no incentives.

Informational Feedback Group (Experimental Group 2). Staff reading teachers in this group followed the same testing procedures as teachers in the first experimental group. However, after the principal had submitted a summary of pupil skill mastery to the investigator, teachers were given informational feedback and positive social incentives in the form of letters from the investigator summarizing the number of skills mastered by children in the particular instructional units, and by positive statements of praise. Each principal and staff member in this group received similar letters from the investigator; the test data information, however, related only to their respective schools. The letters were addressed to each participating teacher and were distributed by the building principal. Thus, the incentives were handled by the principal in that he was provided with objective-based informational feedback that could serve as a basis for principal-teacher conferences.

Monetary Incentive Group (Experimental Group 3). Staff teachers in this group followed the same testing procedure as the teachers in the two other experimental groups. However, the summary of pupil reading skill

mastery submitted by the principal was used by the investigator as a basis for providing monetary incentives to staff teachers. The amount of money paid to teachers as an incentive was directly related to the reported number of reading skills mastered by pupils in the unit.

In September 1972, the teachers in both the control group and the experimental groups responded to the interpersonal variables questionnaire. In addition, they administered all Wisconsin Tests of Reading Skill Development: Word Attack, Levels B and C. Teachers were instructed to encourage pupils to complete as many tests as possible; however, they were permitted to cease testing when students reached frustration point.

In September 1973, post data were collected via the interpersonal variable questionnaire for teachers, and via Levels B and C of the Wisconsin Tests of Reading Skill Development: Word Attack for students.

RESULTS AND CONCLUSIONS

The experimental design of the study was a pretest-posttest control group design with randomization, consisting of three experimental groups, each of which received a different motivational treatment. A multiple analysis of variance and descriptive statistics were examined to determine if certain variables influenced (1) mastery of pupils' reading skills, and (2) perception of teachers' interpersonal variables. The variables were (1) pupil reading achievement monitored without feedback to teachers, (2) informational feedback given to teachers, and (3) money incentives given to teachers. Further effects of the three treatments were compared in one control and three experimental groups.

The data failed to reject the first hypothesis, that pupils in the control group and pupils in the experimental groups would not differ significantly in reading skill mastery. The following are three questions used to test the first hypothesis.

1. Does monitoring of pupil reading skill mastery without feedback to the teacher act as an incentive?

2. Do monitoring of pupil reading skill mastery and providing teachers with informational feedback affect the amount of pupil learning?

3. Do monitoring of pupil reading skill mastery and providing teachers with monetary incentives affect the amount of pupil learning?

All three questions can be answered together. Based on the data from this study, it is clear that the amount of skill mastery from pretest to posttest was significantly different at the $p < .001$ level for (1) all three groups, but no significant difference could be detected between groups at the $p < .05$ level except for one skill, Base Words.

The data also failed to reject the second hypothesis, that teachers in the control group and teachers in the experimental groups would not change their perceptions of selected interpersonal variables. On the basis of this study, it would appear that incentives based on pupils' achievement do not affect teachers' perceptions of interpersonal variables

related to the school learning climate, staff meetings, the building principal, and innovation. Analysis of the data revealed no significant difference at the $p < .05$ level.

In conclusion, this investigation found that the three motivational treatments, (1) pupil reading achievement monitored without feedback given to teachers, (2) social incentives given to teachers, and (3) monetary incentives given to teachers, did not produce student scores significantly different from those in the control group. In addition, analysis of teacher questionnaires revealed that for all treatment groups and on all measures of teachers' perceptions of interpersonal variables, no significant changes occurred as a result of the treatments.

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